Claims

1. A recording medium for perpendicular recording comprising a substrate, a non-magnetic seedlayer on the substrate, a soft magnetic underlayer on the seedlayer and a perpendicular magnetic recording layer, the underlayer comprising an easy axis of magnetization directed in a direction substantially transverse to a traveling direction of a magnetic head reading the recording medium, wherein the underlayer without the seedlayer is isotropic and the seedlayer induces anisotropy in the underlayer, said anisotropy being in the easy axis of magnetization directed in the direction substantially transverse to the traveling direction of the magnetic head.

2. The medium of claim 1, wherein the recording medium comprises a substantially radial or transverse anisotropy.

3. The medium of claim 1, wherein non-magnetic seedlayer comprises a Co-containing material.

4. The medium of claim 1, wherein the underlayer provides a return path for a recording head.

5. The medium of claim 4, wherein the underlayer amplifies a perpendicular component of a write field in a recording layer overlying the underlayer.

6. The medium of claim 1, wherein the seedlayer can change the magnetostriction of the underlayer.

7. The medium of claim 1, wherein the underlayer comprises a material selected from the group consisting of a permalloy, a FeCoB alloy, a NiFe alloy and a FeAlN alloy.

8. The medium of claim 1, wherein the recording medium is selected from the group consisting of a disk and a tape.

9. The medium of claim 1, wherein the seedlayer comprises a material selected from the group consisting of CoCr and a CoCr-alloy.

10. The medium of claim 1, wherein a thickness of the underlayer is about 200-400 nm.

11. A method for manufacturing a magnetic recording disk for perpendicular recording of claim 1, comprising:

applying a magnetron field

depositing a seedlayer on a substrate and

depositing an underlayer on a seedlayer,

wherein the underlayer comprises an easy axis of magnetization directed in a radial direction of the magnetic recording disk.

12. The method of claim 11, further comprising heating the substrate.

13. The method of claim 11, wherein the depositing an underlayer is by sputtering.

14. The method of claim 13, wherein the sputtering is a reactive sputtering.

15. The method of claim 11, wherein the substrate is kept stationary during said depositing a magnetic underlayer.

16. The method of claim 15, wherein a diameter of a magnetron source producing the magnetron field is larger than a diameter of the substrate.

17. The method of claim 11, wherein the substrate is rotated during said depositing a magnetic underlayer.

18. The method of claim 17, wherein a size of a magnetron source producing the magnetron field is smaller or comparable to a diameter of the substrate.

19. The method of claim 18, wherein the substrate is placed off-center with respect to the magnetron source.

20. The method of claim 11, wherein non-magnetic seedlayer comprises a Co-containing material.

21. A disk drive comprising a magnetic recording disk for perpendicular recording, wherein the magnetic recording disk comprises a substrate, a non-magnetic seedlayer, a soft magnetic underlayer on the substrate and a perpendicular magnetic recording layer, wherein the underlayer comprises an easy axis of magnetization directed in a radial direction of the magnetic recording disk, wherein the underlayer without the seedlayer is isotropic and the seedlayer induces radial anisotropy in the underlayer.

22. A magnetic recording disk for perpendicular recording comprising a substrate, a non-magnetic seedlayer on the substrate, a soft magnetic underlayer on the seedlayer and a perpendicular magnetic recording layer, wherein the underlayer without the seedlayer is isotropic and the seedlayer induces radial anisotropy in the underlayer.